

Large Area Damage Testing of Conventionally Grown KD*P at 351 nm on the Beamlet Laser

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Abstract

The maximum operational fluence requirement for KD*P frequency triplers on the National Ignition Facility (NIF) is equivalent to 14 J/cm^2 in a 3 ns gaussian pulse. Results from standard, small area damage test at LLNL indicate that current state-of-the-art conventionally grown KD*P crystals cannot survive this fluence level without laser conditioning.

We performed large area damage tests using the Beamlet laser at 351 nm on state-of-the-art conventionally grown KD*P crystals in order to verify the accuracy of small area test results and to investigate sample conditioning and survivability at fluences in excess of the 14 J/cm^2 redline fluence.

The results of single shot and ramped fluence tests performed on four 15 cm KD*P triplers using a 7 cm square beam indicate that 1) small area S on 1 (S/1) test results from our damage facilities are accurate predictors of large area, single shot sample performance and 2) significant sample conditioning is achievable on-line using a few low fluence pulses. The second point is significant because it eliminates the need for off-line raster conditioning of tripler crystals and results in a significant cost savings for the NIF project.

*Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.